Le tableau 1 donne des éléments de comparaison entre la distillation thermique et l'osmose inverse.

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Assessment of Water Quality from Desalination Plants in Oran (Western Algeria): Technologies, Impacts, and Future Directions

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INTRODUCTION & AIM

All desalination plants in Oran (Western Algeria) employ reverse osmosis membrane technology, except the Kahrama plant in Arzew, Oran, which utilizes a Multi-Flash (MSF) distillation process or staged expansion. The current study assessed the quality control of desalinated water at the Kahrama and Bousfer plants.

The study also addresses environmental and public health impacts, including energy consumption and brine discharge. It highlights challenges like high costs while identifying opportunities for improving efficiency and sustainability. The paper aims to provide insights into the current state of desalination in Oran and offers recommendations for optimization while considering environmental and health issues.

METHOD

Décantation

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Prétraitement chimique

- ~~Dosage de l'hypochlorite de sodium~~
- Dosage de l'acide sulfurique

- ~~Dosage de l'hypochlorite de sodium~~
- Dosage de l'acide chlorhydrique
- ~~Dosage de bisulfite de sodium~~
- Injection de la soude caustique

Prétraitement physico-chimique

- Filtration sur sable
- Microfiltration sur cartouche

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Système d'Osmose Inverse

- Membrane spirale (polyamide aromatique)
- Pompe à haute pression P= 68 bar
- PH avant = 5.8 à 6.5

Post-traitement

- Minéralisation
- Désinfection

- Correction du PH par le dioxyde de sodium
- Désinfection

To assess the effectiveness of desalination at BOUSFER and KAHRAMA plants we evaluated the physicochemical qualities of water at different levels. The following diagram shows the various testing methods:

Experimental unit ← **Raw water Permiat concentrate**

Type of analysis

Analyses physico-chimiques

- T, PH, Cond, salinity (potentiométric)
- Mg, ca, Th (complexométrie)
- Carbonate et bicarbonate (volumétric)
- Na, K par spectrophotométriy

Evaluation of the efficiency of the process

RESULTS & DISCUSSION

Water Quality and Safety

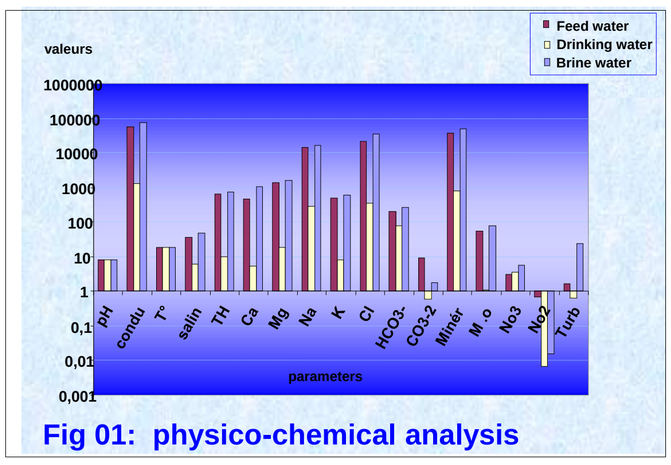

Fig 01: physico-chemical analysis

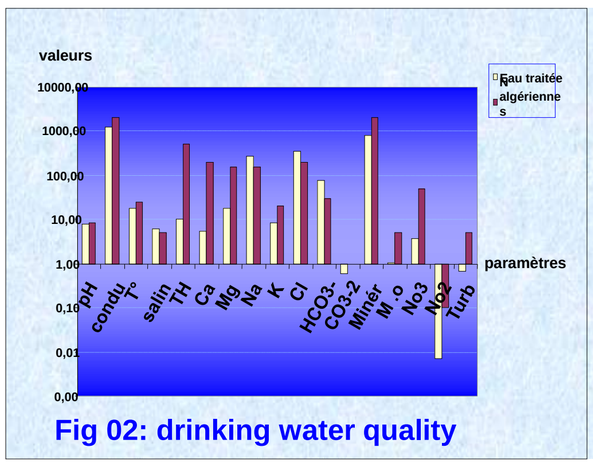

Fig 02: drinking water quality

	DISTILLATION	OSMOSE INVERSE
Consommation de vapeur (kg/m³ produit)	100 à 140	0
Besoins en eau de mer (m³ / m³ produit)	3 à 4	1,7 à 2,5
Température de fonctionnement	70 à	= température eau de mer
Consommation électrique (kW/m³)	2 à 4	3 à 4
Température de l'eau produite	Température de la mer +	= température eau de mer
Salinité de l'eau produite (mg/l)	10 à 50 mg/l	200 à 500 mg/l

parameters	sea water	distilled water
PH	8,02	6,58
Conductivity	54500	30,4
Temperature	20	32
Total Dissolved Salts	39240	1,5
Alkalinity	121	0
Total Hardness	6500	0
Chlorides	9570	0
Calcium	1250	0
Magnesium	820,12	0
Iron	0,02	0
Dissolved Oxygen	8,47	0

The three spheres of sustainability, we allowed to make recommendation and to guarantee a good management of this plants were: environmental, social and economic.

Social tools

- ✓ Good choice of desalination plant
- ✓ Good gouvernance (state, civil society, global economic environment) .
- ✓ Enhancing skills and competencies in this sector.

Economiques tools

- ✓ Produce membranes with a low pressure.
- ✓ It is necessary to use sodium caronate instead of soda,which is very expensive and highly dangerous.
- ✓ Improve renewable energy research.
- ✓ Develop other technologies.

Environmental tools

- ✓ Use a computer system for the quality monitoring.
- ✓ Apply appropriate pretreatment and treatment.
- ✓ Elaborate the standards for a full environmental impact assessment.

CONCLUSION

The awareness of the necessity to do something is in itself an extremely positive element. It remains that only the set of political wills mobilized for this awareness, conjugated to the efforts of all the actors of the water can lead to results in the measure of the experience of the state, for the healthiest and most harmonious possible natural environment for the future generations.

FUTURE WORK / REFERENCES

Expansion Plans: Algeria plans to build seven new desalination plants by 2030 to increase capacity and meet growing demand.
Renewable Energy Integration: Efforts are underway to incorporate solar energy into desalination processes to reduce environmental impact 3.

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