# Review of: "Non-revenue Water Reduction"

German Alberto Echaiz Espinoza[1]

1 Universidad Nacional de San Agustin

Potential competing interests: No potential competing interests to declare.

Journal

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Title

**Non-revenue Water Reduction**

Author

Zakaria Yehia
*Civil Engineering, Thebes Academy,* Cairo, Egypt.

*Email: z.yehia@thebes.edu.eg*

*ORCID iD: 0000-0003-3672-2286*

Abstract

SCADA systems are essential for water management in smart cities. They provide real-time monitoring, control, early detection of issues, efficiency improvements, enhanced resilience, and data-driven decision support. By leveraging SCADA technology, water utilities can optimize operations, reduce water losses, ensure a reliable supply, and contribute to sustainable water management in smart cities.

Non Revenue Water (NRW) refers to water that is produced and lost before it reaches consumers or generates revenue for water service companies (WSCs). The summary highlights the importance of reducing non-revenue water as it leads to increased water availability and revenues for WSCs. This is done by installing flow meters and water pressure measuring devices on the water sources or the entrances and exits of the isolated area, then calculating the amount of water feeding the area and the amount of water accounted for; from it, the amount of non-accountable water can be calculated, and work can begin to reduce it by detecting leakage, detecting stealth connections, and installing water meters that work efficiently. The reduction of commercial losses, which includes issues like inaccurate billing or theft, can significantly improve revenue generation. Similarly, reducing physical/real losses, such as leaks or inefficient distribution systems, allows WSCs to postpone capital investments needed for water source development. To address this issue, departments such as Network Operations, Geographic Information Systems (GIS), Hydraulic Analysis, and the

commercial sector must collaborate to estimate and identify the different components contributing to NRW and water loss reduction.

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Quality of English Language:

English language and style are fine/minor spell check required.

Suggestions:
https://www.nature.com/scitable/ebooks/english-communication-for-scientists-14053993/126083980#bookContentViewAreaDivID

https://www.editage.com/insights/the-secret-to-using-tenses-in-scientific-writing

**Abstract section**

The abstract partially follows the abstract structure for informative abstracts and needs some adjustments for better clarity and alignment:

Strengths:

- Introduces the importance of SCADA systems in water management for smart cities (introduction).
- Briefly mentions the problem of non-revenue water (NRW) (context).
- Outlines some methods for NRW reduction (methods).
- Presents clear sections for introduction, methods, results, and conclusions.

Weaknesses:

- Lacks a clear thesis statement and the specific research question addressed.
- Doesn't specify the context of the research (e.g., location, study population).
- Doesn't present specific results beyond mentioning general methods.
- Lacks a concluding statement summarizing the research's implications and contributions.

Suggestions for improvement:

- Start with a concise thesis statement: Briefly state the research question and the primary aim of the study.
- Provide context: Mention the specific location or context where the research took place (e.g., city, water utility company).
- Summarize specific results: Instead of generic methods, highlight key findings regarding NRW reduction and its impact on efficiency or revenue.
- Conclude with implications: Briefly explain the significance of the research findings and their potential application for water management in smart cities.

**Introduction section:**

- Purpose and Structure: This section is missing in the provided text. You can add a sentence or two stating the research aim and overall structure of the paper.
- Background: This section is present and effectively highlights the issue of NRW and its significance.
- Providing Appropriate Citations: There are some citations, but consider incorporating more specific references to support your claims about underestimation of NRW and the need for reliable quantification.
- Concluding Remarks: This section is present but could be strengthened by explicitly stating the research question and its importance.

Improvements:

1. Add a Purpose and Structure statement: Briefly introduce the research aim and outline the main sections of the paper (e.g., problem statement, methods, results, etc.).
2. Strengthen the Background:
    - Provide specific data or statistics on global NRW levels and its economic impact.
    - Briefly mention existing methods for NRW quantification and their limitations.
    - Emphasize the gap in knowledge regarding accurate NRW estimation, particularly in the context of your chosen location or case study.
3. Refine the "Underestimation" section:
    - Cite specific reports or studies documenting underestimation of NRW.
    - Clarify the factors contributing to underestimation (e.g., inaccurate data, reporting practices, institutional pressures).
4. Strengthen the Concluding Remarks:
    - Clearly state the research question, focusing on the specific gap you're addressing (e.g., "This paper investigates the development of a reliable method for quantifying real losses within the NRW framework...").

Briefly highlight the significance of your research for improving water management efficiency and sustainability.

**Methods Section**

The methods are not adequately described.

In this work, the topic of Non-Revenue Water Reduction was addressed by installing flow meters and water pressure measuring devices on the water sources and sending this data to a SCADA.

The article is detailed in the steps to follow but lacks more detail in the technical aspects.

**As suggestions:**

1. Include cost of the hardware and SCADA.
2. More details on the hardware. Needs P&ID.
3. References (state of the art) are not sufficient.

**Results Section**

The results are not clearly presented.

The Results (also sometimes called Findings) section in a research paper describes what the researcher(s) found when they analyzed their data. Its primary purpose is to use the data collected to answer the research question(s) posed in the introduction.

There is no data in this section.

**Discussion section**

No results, no discussion.

**Conclusion section:**

The provided conclusion partially follows the suggested structure for a research paper conclusion outline:

I. Summary of main findings:

- Mentions the reduction in water production after installing meters and operating the SCADA system (7% in April, 13% in May).
- Briefly highlights the potential for more accurate loss calculations with the SCADA system.

II. Restate the research question/objective:

- The specific research question or objective is not explicitly restated in the conclusion. This would be helpful for readers to connect the findings back to the initial goals of the study.

III. Discuss the implications of the findings:

- The conclusion mentions the potential for expanding the SCADA system and using AI/ML for better analysis, but it doesn't fully discuss the broader implications of the findings. This could include potential benefits for water management, cost savings, and reduced water loss.

IV. Acknowledge limitations and suggest future research:

- The conclusion doesn't mention any limitations of the study or suggest directions for future research. This could include limitations like the short study period, specific location focus, or potential uncertainties in data collection.

Overall, the conclusion presents some key findings but could be strengthened by:

- Restating the research question/objective.

- Discussing the implications of the findings in more detail.
- Acknowledging limitations and suggesting future research directions.
- It lacks specific directions for future research.
- Broader implications not discussed