

# Non-Revenue Water reduction: a critical step towards commercial viability

WSUP works with water utilities around the world to reduce their rates of Non-Revenue Water (NRW). This Practice Note describes a successful NRW programme undertaken by WSUP and JIRAMA, Madagascar's state electricity and water utility in the capital city, Antananarivo (Tana).



Leak detection and repair, Antananarivo

## What is Non-Revenue Water?

NRW is water that does not generate revenue for the utility from its point of processing to its endpoint. NRW is usually assessed under physical and commercial losses and can be caused by infrastructural problems (such as leaking pipes) or commercial issues like incorrect billing, faulty meters and illegal connections to the water network. Utilities with high NRW rates cannot provide a sustained and reliable service for their customers, and often lack the capacity to fix problems or extend the network. Customers can then become reluctant to pay for a poor service, further reducing the revenue available for network improvements (demonstrated by Fig. 1).

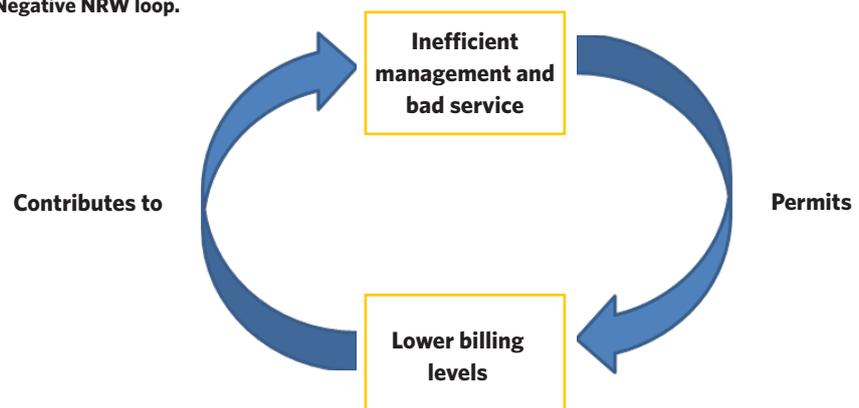
## JIRAMA's NRW reduction programme: key features

WSUP has been working with JIRAMA since 2008 and has been supporting their NRW reduction programme since 2010, aiming to improve the utility's financial efficiency and overall performance. Leakages from the city's ageing water pipe network, coupled with the lack of a planned NRW approach, were losing the utility an estimated 19-20 million m<sup>3</sup> of water per year<sup>1</sup>; JIRAMA struggled to provide an adequate service to its existing customers and was unable to extend services into new areas.

JIRAMA's priority was to establish greater control over Tana's water flows, to curb leakages and reduce NRW. District Metered Areas (DMAs) were set up in all peri-urban areas covered by the JIRAMA network and part of central Tana: water piped to these zones can be measured and isolated, so JIRAMA staff can identify leaks and undertake active leakage management. This vital information on water flow enables continuous monitoring through water balance analyses and helps to control water loss. The remaining areas of central Tana uncovered by DMAs will be covered over the next few years. Pressure Reducing Valves (PRVs) were introduced to deal with pressure management including reducing nightly leakage rates and improving water delivery.

Institutional reforms within JIRAMA saw the establishment of a strategic unit dedicated to NRW, a leakage detection and reparation service and a low-income consumer unit. These structural changes led to the embedding of NRW management within JIRAMA's service delivery process and enabled staged and systematic roll-out across Tana's operating zones.

Figure 1. Negative NRW loop.



<sup>1</sup> JIRAMA water balance analysis, 2015.

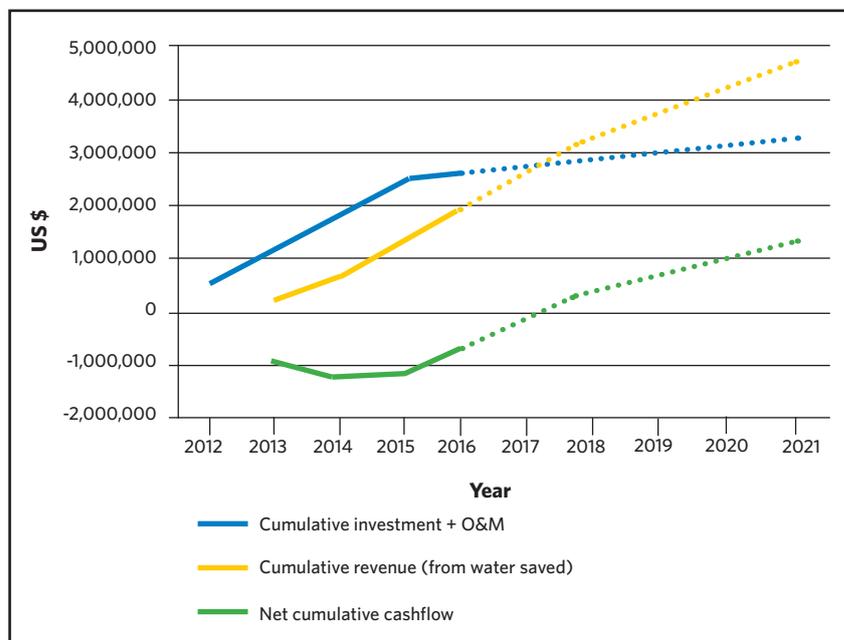
## Programme outcomes

The NRW management programme has resulted in significant savings across Tana which will continue to increase with time (see Table 1 below). These impressive outcomes confirm the programme’s value to both the utility and existing customers. Importantly, the reduction in NRW has enabled JIRAMA to extend coverage to poorly served low-income areas in Tana. More information on programme outcomes including a cost-benefit analysis is presented below.

### JIRAMA's NRW reduction programme: cost-benefit analysis

Figure 2 shows that during the forecast 10-year period JIRAMA's net cumulative cashflow from this NRW programme will be positive from 2017 based on the actual investment costs together with the estimated operation and maintenance costs and revenue from water saved from the recorded flow data and water balance analysis. The estimated revenue over the projected 10-year period based on conservative projections on water saved is approximately US \$4.7 million with a net gain of approximately US \$1.4 million (including operation and maintenance costs). The attractive financial returns are confirmed by economic indicators estimating the Net Present Value (NPV) over the 10-year period based on a 10% discount rate as \$853k (on a capital investment of \$2.32 million) and the Internal Rate of Return (IRR) at 16.3%.

**Figure 2. Cost-benefit analysis of JIRAMA's NRW reduction programme, 2012-2021.**



The increases in water availability and JIRAMA’s revenue resulting from the programme have translated into significant benefits for consumers across Tana: water supply is more reliable, and service delivery to low-income consumers has been enhanced through networks of newly constructed water kiosks, laundry blocks and WASH blocks (for laundry and sanitation). JIRAMA’s pro-poor policies have also given poorer households the option of staged payments to connect to the network. WSUP estimates that more than 710,000 low-income consumers have benefited from the NRW reduction programme since 2010.

**Table 1. Programme outcomes to date in Antananarivo.**

	Pre-programme	Mid-programme (data accurate to 2016 unless otherwise stated)
<b>NRW (South zone)</b>	48% (2012)	39% (2015)
<b>Total water supplied</b>	Increased by 12 million m <sup>3</sup> from 2012-2015	
<b>Water saved (due to leakage management)</b>	1.44 million m <sup>3</sup>	3.6 million m <sup>3</sup>
<b>Continuity of supply</b>	3 hours per day	6-24 hours per day
<b>Water kiosks</b>		408
<b>Laundry blocks</b>		61
<b>Sanitation blocks</b>		12
<b>WASH blocks</b>		3
<b>New household connections</b>		435
<b>Estimated total beneficiaries of an improved water supply</b>		710,000

### Next steps: towards national scale-up

The longer JIRAMA's NRW programme continues, the more benefits (including financial returns and improved services) will continue to accrue. With WSUP’s support, JIRAMA plans to continue the programme to cover the whole of its service area in Tana within the next three years. JIRAMA is also replicating these strategies in other cities across Madagascar - Mahajanga, Fort Dauphin, Fianarantsoa and Antsiranana - and is working on the establishment of a nationwide NRW programme.

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