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# Targeted Water Quality Assessment in Small Reservoirs in Brazil, Zimbabwe, Morocco and Burkina Faso

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Background
Physical and chemical parameters of water in reservoirs can be affected by natural and manmade pollutants, causing damage to the aquatic life and water quality. However, the exact water quality considerations depend on what the water will be used for. Brick making, livestock watering, fisheries, irrigation and domestic uses all have their own specific water quality requirements. In turn, these uses impact on water quality.

Methodology
Water quality was assessed with a variety of methods in small multipurpose reservoirs in the São Francisco Basin in Brazil, Limpopo in Zimbabwe, Souss Massa in Morocco and Nakambé in Burkina Faso. In each case the first step was to select the reservoirs for which the water quality was to be monitored, then identify the main water uses, followed by a determination of key relevant water quality parameters. In addition, a survey was done in some cases to identify quality perceptions of the users. Samples were taken from the reservoir itself and related water bodies such as canals and wells where relevant.

Results
Accordingly in the four basins different methods gave different locally relevant results.
In the Preto River in the Sao Francisco in Brazil small reservoirs are mainly used for irrigated agriculture. Chemical analysis of various small reservoirs showed that water quality was mainly influenced by geological origins. In addition there was nutrient inflow from surrounding areas of intensive agriculture with high fertilizer use.
In the Limpopo basin in Zimbabwe small reservoirs are used for almost all community water needs. Plankton was selected as indicator and sampling was carried out in reservoirs in communal areas and in a national park. Park reservoirs were significantly more diversified in phytoplankton taxa compared to those in the communal lands, but not for zooplankton, though communal lands had the highest zooplankton abundance.
In Souss Massa in Morocco a combination of perceptions and scientific water quality analyses was applied to a small reservoir. High levels of fecal coliform bacteria were found in the reservoir, which made it unfit for human and animal consumption but suitable for most other purposes.
In Burkina Faso, the Nakambé basin has been targeted because of its elevated densities of both population and (small) reservoirs that are used for irrigation, livestock, fishing and other purposes. While a large diversity of phytoplankton was found, the massive dominance of aquatic cyanobacteria was the most significant result. Two lakes exhibited significant cyanotoxins concentrations, which had never been documented before. The presence of the involved bacteria in a large number of sites indicated that such contamination with toxins could potentially affect large populations. Classical limnological descriptors failed to explain the observed situations. Conversely, the cyanobacterial abundances were positively correlated with population densities and land-use. This is probably associated with agricultural intensification and particularly horticulture around most reservoirs, because of the high use of pesticides and their selective impacts on plankton communities that tend to favor cyanobacteria. Still, the scientific hypotheses linking human activities to water quality remain to be formally assessed.

Discussion and conclusion

Both financial difficulties and the frequent absence of specific and academic local competences limit the implementation of relevant water quality monitoring programs. However, on the basis of our findings in four basins we postulate that while the mobilization of water resources has been an emergency priority for a long time, now the time has come to explicitly target the preservation and protection of aquatic ecosystems. This urgent need should dominate the debate on sustainable multipurpose exploitation of small reservoirs whose several benefits (especially fisheries) appear clearly linked to their quality.